DOCUMENT RESUME

ED 296 488 EC 210 252

AUTHOR Walter, Gerard G.; Welsh, William A.
TITLE Characteristics and Success of Deaf Students at RIT in Three Types of Educational Environments.
INSTITUTION Rochester Inst. of Technology, NY. National Technical Inst. for the Deaf.
SPONS AGENCY Department of Education, Washington, DC.
PUB DATE 1 Sep 87
NOTE 23p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; Admission Criteria; Assistive Devices (for Disabled); Basic Skills; Certification; *College Admission; College Programs; College Students; Communication Aids (for Disabled); *Deafness; *Educational Environment; Education Work Relationship; Employment Opportunities; *Hearing Impairments; Higher Education; Individual Differences; Partial Hearing; Prerequisites; *Remedial Instruction; Student Characteristics; Student Personnel Services
IDENTIFIERS *National Technical Institute for the Deaf; Rochester Institute of Technology NY

ABSTRACT

The cohort of deaf students attending Rochester Institute of Technology (RIT) from 1976-1980 were grouped into three categories, depending on their educational environments during matriculation: students registered in programs at the National Technical Institute for the Deaf (NTID); in programs both at NTID and in at least one of the other colleges of RIT; and in programs only in other RIT colleges. Analysis of student differences based on category indicated that: (1) significant differences were evident in entering achievement skills among the three categories, with students enrolled only at NTID having the lowest measured achievement skills; (2) rates of achieving some level of certification differed among the three categories; (3) students who received Bachelor of Science degrees after majoring in both NTID and another college of RIT took a significant amount of technical and basic skills coursework at NTID to qualify for coursework in the other colleges; and (4) students receiving higher levels of certification (associate and bachelor degrees) obtained better and higher paying jobs. Overall, at least 97% of deaf RIT students required extensive remedial education, systematic alterations to the delivery of instruction, and other services offered through NTID to enable them to receive a college degree. (Author/JDD)

**********
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
**********

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)
☑ This document has been reproduced as received from the person or organization originating it.
☐ Minor changes have been made to improve reproduction quality.
• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

ED296488

# Characteristics and Success of Deaf Students at RIT in Three Types of Educational Environments

Gerard G. Walter

William A. Welsh

•

September 1, 1987

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

G. Long

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

EC 210252

The research reported in this document was produced at the National Technical Institute for the Deaf through an agreement between Rochester Institute of Technology and the U.S. Department of Education.

# EXECUTIVE SUMMARY

*This study focuses on the cohort of deaf students attending Rochester Institute of Technology (RIT) from 1976-1980. Subjects were grouped into three categories, depending on their educational environments during their matriculation at RIT:*

- Students, at all times, were registered in programs at the National Technical Institute for the Deaf (NTID).

- Students, at different times, were registered in programs both at NTID and in at least one of the other colleges of RIT.

- Students, at all times, were registered in programs in the other colleges of RIT.

The study analyzes data relating to the following questions:

- Do the skills of students in these categories differ significantly?

- What are the graduation rates for students in the different categories?

- What are the occupational levels of graduates from the various categories?

Findings generally indicate the following:

- *Significant differences are evident in entering achievement skills among the three categories.* Students enrolled at NTID exclusively have the lowest measured achievement skills, while those enrolled only in the other colleges of RIT have the highest measured skills.

  Generally, entering deaf students can be divided into three distinct groups: those who would never be able to achieve in a traditional college environment (75 percent); those who, with a significant amount of basic skill remediation and classroom support, could attain an A.A.S. or B.S. from the other colleges of RIT (22 percent); and those who could attain a

B.S. degree with classroom-oriented support services of interpreting, notetaking, and tutoring (3 percent).

- *Rates of achieving some level of certification differ significantly among the three categories.* Students enrolled in the other colleges of RIT have a graduation rate of 72 percent; those enrolled in both NTID and another college of RIT have a rate of 68 percent; and those who study only at NTID have a rate of 50 percent. These differences probably result from differences in basic skill levels among the three categories.

- *Students who received B.S. degrees after majoring in both NTID and another college of RIT took a significant amount of coursework at NTID.* This finding probably results from the extensive amount of technical and basic skill remediation required for students in this group to achieve in the mainstreamed college classroom. Much of this coursework is in the areas of general education and communication.

- *Students receiving higher levels of certification (A.A.S. and B.S. degrees) obtain better and higher paying jobs.* This finding probably results from a combination of better basic skill levels and a higher level of technical training obtained through achievement of the more advanced degree. As a group, students receiving some form of certification earn more money than those exiting from RIT with no certification.

Overall, it is concluded that at least 97 percent of deaf RIT students require extensive remedial education, systematic alterations to the delivery of instruction, and other services offered through NTID to enable them to receive a college degree from RIT. Because of the relatively better earnings for higher degree recipients, students must be encouraged to seek the highest degree possible in their field of study. In addition, some specific steps should be instituted to assure that students who withdraw, especially from NTID, have explored all options before leaving RIT.

## INTRODUCTION

NTID at RIT was established to enhance educational, social, and employment opportunities for deaf persons. Through technical education, professional training, and applied research, NTID strives to contribute to the long-term career, economic, and social fulfillment of deaf persons nationally.

*The Policies, Guidelines and Application Procedures*[1] for NTID describe not only the necessity of developing technical skills for deaf students, but also the desirability of "an environment that facilitates and encourages students to achieve a high degree of personal development and a sense of social responsibility." Thus, NTID's curriculum has been designed to assist young deaf people in reaching these goals. With the passage of Section 504 of the Rehabilitation Act of 1973 (P.L. 93-112), as amended in 1974 (P.L. 93-516) and 1975 (P.L. 94-142), the concept of "least restrictive environment" became a goal in providing education to children with handicaps. While this concept often is considered synonymous with placement in the mainstream, the law specifies that there be a continuum of alternative education placements. This continuum must include a range of educational placements such as "instruction in regular classes, special classes, special schools, home instruction, and instruction in hospitals and institutions."

The law also specifies that this continuum include supplementary services to be provided in conjunction with regular class placement. While P.L. 94-142 applies only to children ages 3-18, section 504 of the Rehabilitation Act of 1973 provides for the extension of mainstreaming to the postsecondary environment. The question addressed in this study is whether the educational environment at NTID is "least restrictive" for severely to profoundly deaf students.

Deaf RIT students can choose from a variety of curricular, co-curricular, and support services that are designed to help them succeed both academically and socially. For example, they can study in an environment composed predominantly of deaf (NTID) people; or one composed predominantly of hearing people (the other colleges of RIT). Qualified deaf students can enroll in classes at one of the other colleges of RIT immediately upon entry; matriculate at NTID, and later transfer to another RIT college; or

[1] *Policies, Guidelines and Application Procedures, U.S. Department of Health, Education and Welfare, 1965.*

they may take courses in NTID and another RIT college concurrently. Finally, deaf students can enroll and graduate from NTID alone.

These options provide an opportunity to investigate many types of curricula for deaf students. The effectiveness of these curricula on students' academic and career behaviors then can be evaluated.

In the context of NTID at RIT, therefore, deaf students enrolled in programs with hearing students can be compared to deaf students enrolled in "self-contained" NTID classes, as well asto those who function in both types of environments. NTID at RIT permits evaluating these different environments, for a large number of students, in a single postsecondary setting.

For this study, three different educational environments will be operationally defined:

- NTID group--deaf students who are registered at all times in majors at NTID
- Mixed group--deaf students who, at different times, are registered in majors both at NTID and in at least one of the other colleges of RIT[2]
- B.S. group--deaf students who, at all times, are registered in majors in the other colleges of RIT.

These categories provide a way of evaluating students who pursue the educational options available at RIT.

The purpose of this study is to present data relating to the following questions:

- Do the skills of students in these categories differ significantly?
- What are the graduation rates for students in these categories?
- What are the occupational levels of graduates from these categories?

## METHOD

### Subjects

The subjects for this study consisted of the cohort of deaf students who entered RIT under NTID sponsorship from Fall 1976 through Fall 1980. Since the average length of time for a deaf person to obtain a degree at RIT

---

[2] *This category also includes students in a pre-college (of RIT) category.*

is four years,[3] this cohort consists principally of students who have completed their studies.[4] Table 1 presents information about the group assignments of the 1,644 deaf students who entered RIT from 1976-1980.

Table 1. Subjects by year of entry and mainstreaming category

| ENTRY YEAR | CATEGORY NTID | MIXED | B.S. | TOTAL |
|---|---|---|---|---|
| 1976 | 233 | 61 | 16 | 310 |
| 1977 | 245 | 82 | 12 | 339 |
| 1978 | 226 | 74 | 10 | 310 |
| 1979 | 259 | 62 | 13 | 334 |
| 1980 | 266 | 79 | 6 | 351 |
| TOTAL | 1,229 | 358 | 57 | 1,644 |

Table 1 illustrates that the method of selecting students who entered in the five years from 1976-1980 yielded a total pool of 1,644 subjects; 74.8 percent (N = 1,229) of the students are in the NTID group, 21.8 percent (N = 358) in the mixed group, and 3.5 percent (N = 57) in the B.S. group.

How do the 1,644 students used for this study compare with deaf students who entered RIT in 1985? This comparison is necessary in order to comfortably generalize the findings of this study to current NTID practice.

Table 2 presents data for academic and communication variables for the study group and for deaf students who entered RIT in 1985. As illustrated in Table 2, students who entered during the period from 1976-1980 differ little from those who entered in 1985. The one exception is that students who entered in 1985 appear to have slightly better sign language skills than those who entered earlier.

From the data on academic achievement and communication, it can be concluded that the average achievement for students entering NTID is about

[3] *Educating Students at Gallaudet and The National Technical Institute for the Deaf: Who are Served and What are the Costs? Report to the chairman, subcommittee on the handicapped, Committee on Labor and Human Resources, United States Senate by the U.S. General Accounting Office, GAO/HRD-85-34, March 22, 1985, 94-95.*

[4] *As of the Fall quarter 1985, all but 33 students in the cohort had exited from NTID/RIT. This number represents approximately 2 percent of the total population of 1,644 students.*

9.0, with reading skills at about the eighth-grade level and mathematics skills between the ninth- and tenth-grade levels. This achievement level represents the top 10 percent of deaf secondary school learners nationally (Trybus and Karchmer, 1977).

In the communication area, subjects can be characterized as able to understand only isolated words or phrases in a spoken conversation, with little understanding of the content of the message. Speech skills are such that a trained listener can understand little of a student's spoken language except for a few isolated words or phrases. Students' measured sign language skills indicate that they are able to receive, in this mode, most of the content of the message, but even here the standard deviation would indicate that, without improvement in their skill levels, a significant number of students cannot use sign language as a viable means of communication.

### Analysis

The data for this study will be presented under a number of classifications: Persistence in College, Entering Achievement Levels, Entering Communication Skills, Where Students Take Their Coursework in College, and Accommodation in the Workplace. For each of these areas, students will be compared across the three categories defined previously, and by their status in the NTID/RIT educational environment as of the Fall quarter, 1985. Five classifications of status are possible:

- bachelor's degree recipient
- associate degree recipient
- certificate or diploma recipient
- withdrawn student
- registered student

## RESULTS

### Persistence in College

The issue of "survival" of students in the NTID environment raises a question concerning the withdrawal rates and levels of graduation for students entering NTID from 1976-1980. Table 3 presents data related to the number of deaf students who leave RIT with and without certification. As of September 1985, 52.5 percent of the 1,644 students (864) had graduated,

45.5 percent (747) had withdrawn, and 2 percent (33)[11] continue to be enrolled. Overall, this 45 percent attrition rate is comparable to other public colleges with liberal admission standards (Beal and Noel, 1980).

**Table 2. Comparison of deaf students entering RIT from 1976-1980 with those entering in 1985.**

| | 76-80 | | | 85 | | |
|---|---|---|---|---|---|---|
| VARIABLE | N | MEAN | SD | N | MEAN | SD |
| ACHIEVEMENT[5] | 961 | 8.9 | 1.37 | 304 | 9.1 | 1.43 |
| READING[6] | 1,604 | 8.3 | 1.58 | 374 | 8.4 | 1.57 |
| MATHEMATICS[7] | 946 | 9.6 | 1.79 | 302 | 9.7 | 1.74 |
| DISCRIMINATION[8] | 959 | 2.7 | .98 | 334 | 2.8 | 1.01 |
| SPEECH[9] | 946 | 3.4 | 1.12 | 354 | 3.5 | 1.21 |
| MANUAL[10] | 1,582 | 3.1 | 1.45 | 336 | 3.9 | 1.43 |

*[5]Total score from the Stanford Achievement Test--Advanced Battery (Madden, et al., 1972). Scores are in grade equivalent with a range from 4.0 to 12.9.*

*[6]Reading subtest from the California Achievement Tests--Junior High Level (Tiegs and Clark, 1963). Scores are in grade equivalent units with a range from 5.0 to 12.0.*

*[7]Mathematics Concepts subtest from the Stanford Achievement Test--Advanced Battery (Madden, et al., 1972). Scores are in grade equivalent units with a range of 4.0 to 12.9.*

*[8]This is a test of hearing ability in which scores are derived using a technique described by Johnson (1976). Scores range from 1 (no ability to understand speech) to 5 (can understand normal speech).*

*[9]Intelligibility of a student's speech when reading the "Rainbow Passage" (Fairbanks, 1960) as judged by a panel of trained listeners (Johnson, 1976). Scores range from 1 (completely unintelligible speech) to 5 (the listener can understand everything).*

*[10]Ability of the student to understand everyday sentences presented in sign language. Scores are derived using a technique described by Johnson (1976) and range from 1 (no ability to understand sign language) to 5 (can understand the complete message through sign language).*

*[11]The majority of these students are enrolled in other colleges of RIT in pursuit of a bachelor's degree.*

Table 3 demonstrates that attrition rates differ considerably for students in the mixed and B.S. categories and those in the NTID category. The attrition rate for students in the NTID category is 50.2 percent, while it is 31.6 percent and 28.1 percent for the mixed and B.S. categories, respectively. The literature (Breland, 1979) indicates that institutions that accept more academically able students show better retention roles. Deaf students in the mixed and B.S. groups are academically better prepared for college, and thus have lower attrition rates--even though they compete with hearing students in the colleges of RIT.

Of the 52 percent (864) of students who have graduated, 40 percent (348) have received certificates or diplomas, 44 percent (382) have received associate degrees, 15 percent (132) have received bachelor's degrees, and two students have received master's degrees.[12]

Table 3. Status in the Fall of 1985 for 1,644 deaf students entering RIT from 1976-1980.

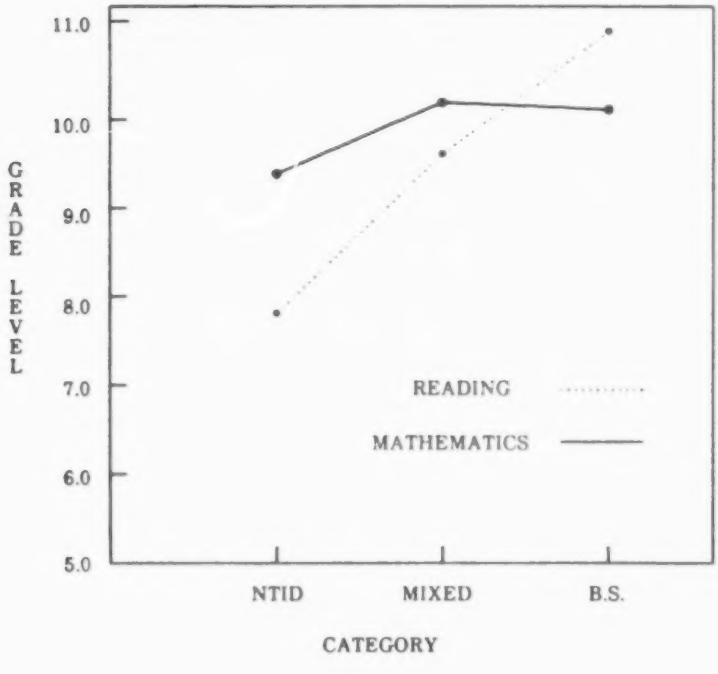
| STATUS | NTID | MIXED GROUP | B.S. | TOTAL |
|---|---|---|---|---|
| REGISTERED | 9 | 22 | 2 | 33<br>2% |
| WITHDRAWN | 618 | 113 | 16 | 747<br>46% |
| CERTIFICATE/ DIPLOMA | 337 | 11 | | 348<br>21% |
| ASSOCIATE | 265 | 117 | | 382<br>23% |
| BACHELOR'S | | 95 | 37 | 132<br>8% |
| MASTER'S | | | 2 | 2<br>.1% |
| TOTAL | 1,229<br>75% | 358<br>22% | 57<br>3% | 1,644<br>100% |

[12]*It must be pointed out that the number of students receiving degrees probably will increase as those students still enrolled graduate, most of them with bachelor's degrees.*

## Achievement

The previous section demonstrates the differences in attrition rates among the three categories. Results of other studies (Breland, 1981; Ragosta and Harrison, 1985) suggest that students with better skills have lower attrition rates than those with poorer skills. Figure 1 presents a summary of achievement levels of deaf students upon admission to RIT by mainstreaming category. Two measures were used to evaluate academic achievement: the Mathematics Concepts subtest from the *Stanford Achievement Test* (Madden, et al., 1972), and the Reading Comprehension subtest from the *California Achievement Test--Junior High Level* (Tiegs and Clark, 1964). The results in Figure 1 demonstrate the large differences in reading ability among the three categories. Differences for mathematics are not nearly so great.

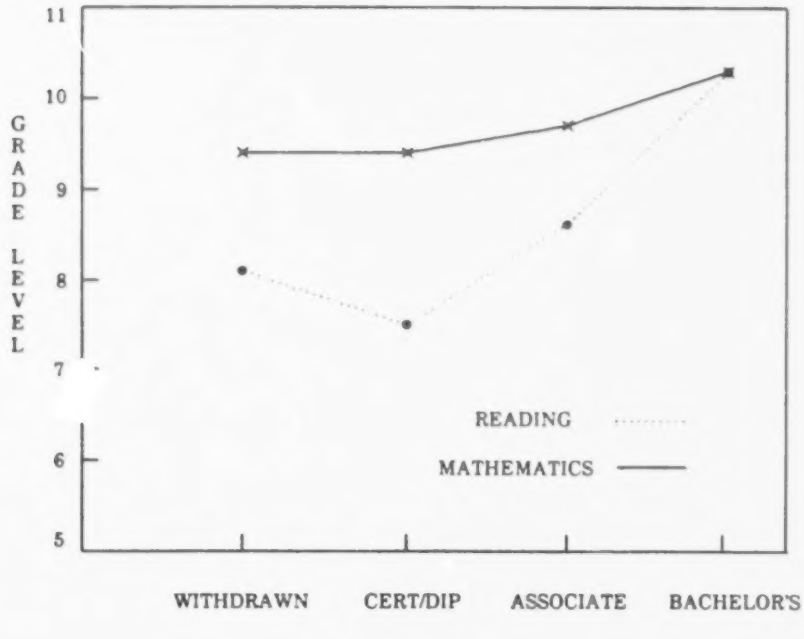
**Figure 1.** Achievement levels of deaf RIT students by mainstreaming category.




| | | READING | MATH |
|---|---|---|---|
| NTID | $\bar{X}$ | 7.8 | 9.4 |
| | SD | 1.3 | 1.8 |
| MIXED | $\bar{X}$ | 9.6 | 10.2 |
| | SD | 1.5 | 1.8 |
| B.S. | $\bar{X}$ | 11.0 | 10.1 |
| | SD | 1.1 | 1.8 |

Figure 2 graphically summarizes the achievement results by emphasizing differences between degree attainments and students' entering basic achievement skills. It is interesting to note that deaf students receiving bachelor's degrees generally have homogeneous skills in reading and mathematics, while students in the other areas have a considerable gap in achievement levels between the two subjects. Additionally, it appears from Figure 2 that students with reading levels lower than 7.5 as measured by the *California Test* have a relatively low probability of receiving an associate degree.

**Figure 2.** Comparison of achievement by degree levels for deaf RIT students.



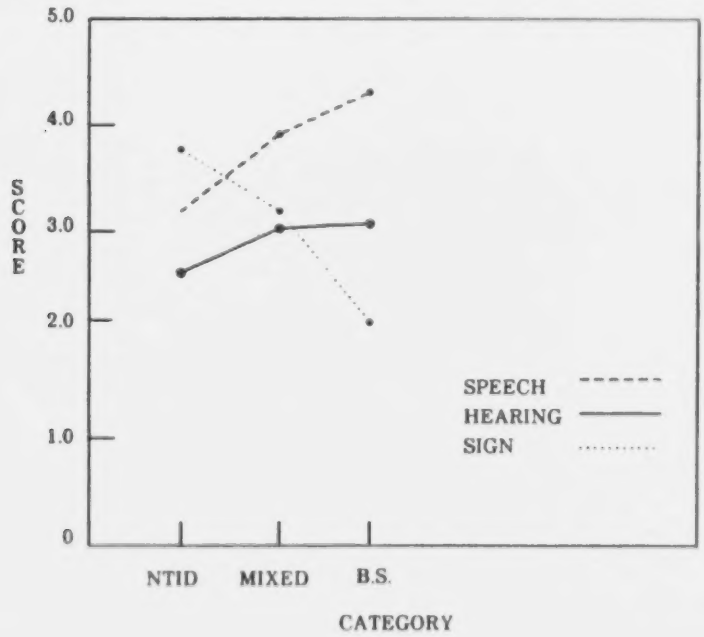

| | | READING | MATH |
|---|---|---|---|
| WD | $\bar{X}$ | 8.1 | 9.4 |
| | SD | 1.5 | 1.8 |
| CT/DIP | $\bar{X}$ | 7.5 | 9.4 |
| | SD | 1.1 | 1.8 |
| AAS | $\bar{X}$ | 8.6 | 9.7 |
| | SD | 1.3 | 1.7 |
| BS | $\bar{X}$ | 10.3 | 10.3 |
| | SD | 1.3 | 1.7 |

## Communication

Severe to profound hearing impairment most often results in handicapping effects in the area of communication. Figure 2 illustrates that most deaf students attending RIT have deficiencies in the ability to read printed English.

Figure 3 indicates differences among the three groups in hearing ability, speech skills, and ability to use sign language at entry to NTID/RIT. Generally, students in the mixed and B.S. groups have better hearing and speech skills but relatively poorer sign skills than students in the NTID group. It is interesting that students who depend most upon interpreters for receiving information in the classroom (the B.S. group) have the poorest sign language skills. It must be remembered, however, that scores presented are entry level skills, and it can be assumed that students' sign language skills improve significantly during matriculation.

**Figure 3. Communication skills of deaf RIT students by mainstreaming category.**

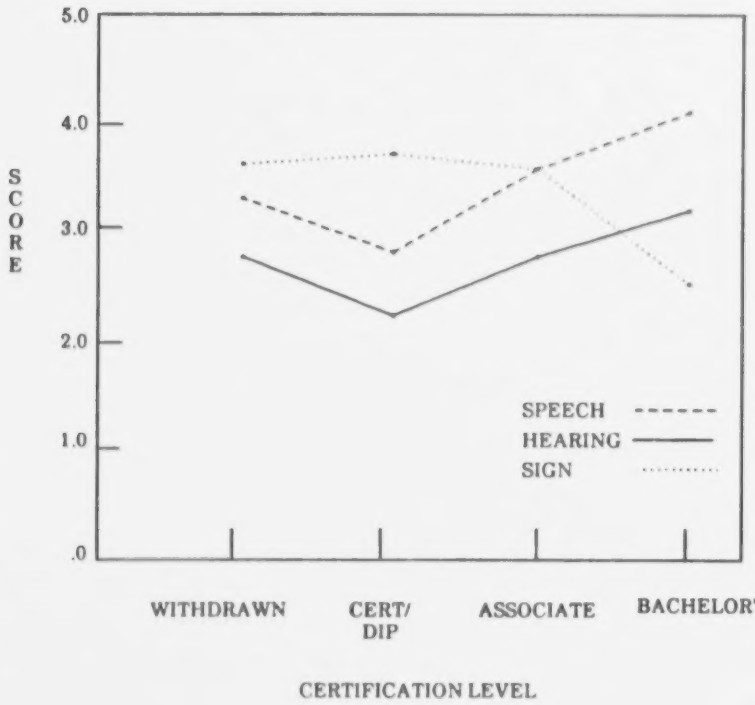



| | | SPEECH | HEARING | SIGN |
|---|---|---|---|---|
| NTID | $\bar{X}$ | 3.2 | 2.6 | 3.8 |
| | SD | 1.1 | .9 | 1.4 |
| MIXED | $\bar{X}$ | 3.9 | 3.0 | 3.2 |
| | SD | 1.0 | 1.0 | 1.6 |
| B.S. | $\bar{X}$ | 4.3 | 3.1 | 2.1 |
| | SD | 1.0 | 1.5 | 1.4 |

Figure 4 summarizes the results of communication skills by level of certification. Students who receive bachelor's degrees have better speech and

hearing skills and poorer sign skills at entry than students receiving associate degrees or certificates and diplomas. These differences should not be interpreted to mean that students with better speech and hearing skills necessarily have a better chance at achieving a higher level of certification. Research has indicated that speech and hearing skills do little to predict degree attainment--reading and language ability are the important variables. The relationship between speech and hearing skills and degree attainment, however, is not causal.

**Figure 4.** Communication skills of deaf RIT students by level of certification.



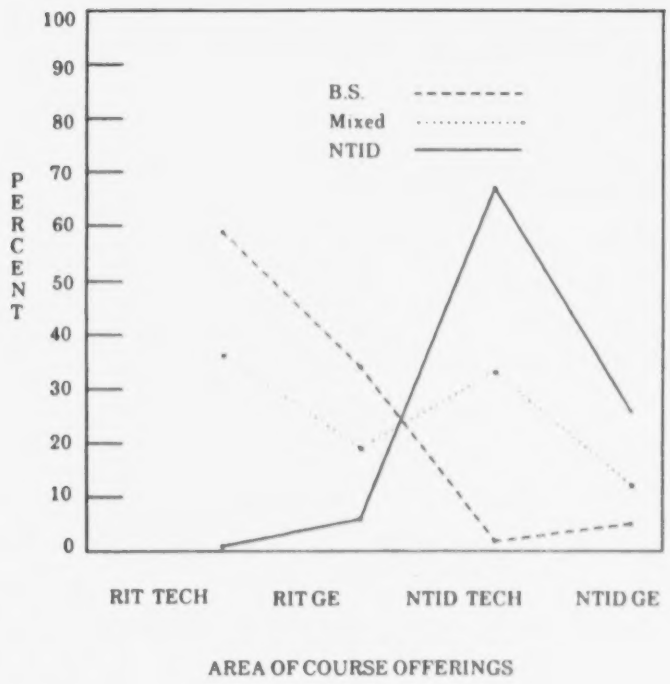

| | | SPEECH | HEARING | SIGN |
|---|---|---|---|---|
| WD | $\bar{X}$ | 3.4 | 2.8 | 3.7 |
| | SD | 1.1 | .9 | 1.4 |
| CT/DP | $\bar{X}$ | 2.9 | 2.3 | 3.8 |
| | SD | 1.1 | .8 | 3.8 |
| A.A.S. | $\bar{X}$ | 3.6 | 2.8 | 3.6 |
| | SD | 1.0 | .9 | 1.4 |
| B.S. | $\bar{X}$ | 4.2 | 3.2 | 2.6 |
| | SD | .7 | 1.1 | 1.5 |

### Distribution of Coursework

Since deaf students can take classes either at NTID (with all deaf students), or in another RIT college (with a mixture of deaf and hearing students), it is important that courses be grouped into different categories. In this study, four classifications have been defined: Technical courses taken at NTID; Communication and General Education courses taken at NTID;

Technical courses taken at RIT; and Liberal Arts courses taken at RIT. The percent of total credit hours taken from each of the above categories is the measure used for the analysis presented in Figure 5.

Figure 5. Percent of coursework taken from four areas of RIT by level of certification.




% CREDITS TAKEN

| | TECH | | GEN ED | |
|---|---|---|---|---|
| | RIT | NTID | RIT | NTID |
| B S | 59% | 2% | 34% | 5% |
| MIXED | 36% | 33% | 19% | 12% |
| NTID | 1% | 67% | 6% | 26% |

From Figure 5, it can be observed that students in the mixed group take a significant number of credit hours at NTID (45 percent), while the B.S. group takes only 7 percent from NTID--2 percent in the technical area and 5 percent in the communication and general education areas. The inference could be drawn from these data that students in the mixed group, because of lower academic skills, need the support courses provided by NTID in both technical and basic skill areas in order to be qualified to pursue coursework in the other RIT colleges. With the exception of persons earning an associate degree, students in the NTID group take almost no courses in the other colleges of RIT. The 6 percent of courses taken from the general education

areas of RIT is almost exclusively the result of the liberal arts requirement for the A.A.S. degree.

It is clear from this section that, when defined in terms of where a student takes coursework, students with different ability levels structure their programs differently. Fifty percent of students majoring in programs offered through NTID take some credits from the other RIT colleges. It appears that only the less able students (those who probably lack the academic preparation) do not take any courses from the other colleges of RIT. From Figure 2 it can be observed that students in the NTID group who have received certificates or diplomas have an average reading grade equivalent of only 7.5. This level of English ability probably is not high enough to allow these students to compete in the curricula of the other RIT colleges. Overall, at least 62 percent of all deaf RIT/NTID graduates take some courses from the other colleges of RIT.

**Accommodation in the Workplace**

Previous sections of this report have concentrated on how students entering NTID from 1976-1980 have performed within the RIT environment. This section provides information on the employment status of deaf RIT graduates. Data are taken from the annual NTID *Alumni Feedback Questionnaire* (AFQ), that is sent to all graduates. Data concerning this questionnaire have been reported by Welsh (1986).

Of the 864 potential graduates in this study, 345 (40 percent) have responded to the questionnaire over the past five years. While it contains many data elements, this study reports data about salary (gross weekly earnings) and occupational classification (U.S. Bureau of the Census occupational classification) at the time the questionnaire was completed. Since the questionnaire is sent only to graduates, there is no data available about students who did not complete certification requirements (withdrawals).

**Occupational Level**

In order to report about occupational level of graduates from the entering classes of 1976-1980, it was necessary to group job types using a classification scheme. The scale used for this classification, shown in Table 4, was derived by categorizing the job classification of graduates into one of six areas. While it is recognized that these categories tend to be ordinal, an assumption of continuity from professional (1) to service (6) has been made in order to derive

mean values for each of the groupings used in this study. However, because of the ordinal nature of the data, readers should not infer any correlational meaning from these results, and should not go beyond the use of descriptive statistics when generalizing from this data.

Table 4. Classification of job type into six categories of occupational level.

| CLASSIFICATION | DESCRIPTION |
|---|---|
| 1 | PROFESSIONAL/MANAGERIAL |
| 2 | TECHNICAL/SALES |
| 3 | PRECISION PRODUCTION/CRAFTS |
| 4 | OPERATORS/FABRICATORS/LABOR |
| 5 | FARMING/FORESTRY/FISHING |
| 6 | SERVICE |

Table 5 presents mean job classifications for graduates by category and degree received. The effect of level of certification on job classification is clear--the higher the degree, the better job the graduate typically holds. It must be cautioned that degree level does not, in itself, determine the type of job. Many factors influence the choice of a job, including motivation and conscious decision. The result may be that there is little direct relationship to an individual's degree level. However, the relationship between degree received and job type is clear--individuals with B.S. degrees tend to have professional level jobs; those with associate degrees tend to have technical and sales kinds of jobs; and those with certificates and diplomas have precision and skilled types of jobs.

**Earnings of Graduates**

In addition to the job classifications of graduates, the AFQ collects information about the earnings of graduates. Earnings are reported as weekly salary before deductions, and have been converted for this study into 1985 dollars. In order to increase the number of reported salaries, data from the AFQ for the past five administrations have been used. For example, if the student reported a salary for 1983, but did not answer the AFQ in 1984 and 1985, this last reported salary was multiplied by the 1984 Consumer

Table 5. Mean job levels for graduates of the classes entering from 1976-1980 by mainstreaming category.[13]

| DEGREE | | CATEGORY NTID | MIXED | B.S. |
|---|---|---|---|---|
| | $\bar{X}$ | | 1.6 | 1.3 |
| B.S. | N | | 47 | 19 |
| | SD | | .79 | .48 |
| | $\bar{X}$ | 2.2 | 2 | |
| A.A.S. | N | 134 | 23 | |
| | SD | .86 | .47 | |
| | $\bar{X}$ | 2.7 | 1.8 | |
| CD/DP | N | 115 | 5 | |
| | SD | 1.1 | .45 | |

Price Index increase to arrive at a 1984 salary; the 1984 calculated salary was then multiplied by the 1985 Consumer Price Index increase to arrive at a salary for 1985. This allowed us to significantly increase the N for this study.

Table 6 summarizes the salaries of graduates who entered from 1976-1980. The results in Table 6 support the results reported in Table 5--bachelor's degree students earn more money than associate degree graduates, who earn more than certificate or diploma graduates. Clearly, a higher level of certification significantly influences the earning potential of NTID graduates. While category did not have a significant relationship with job level or salary, there certainly is a trend in favor of the B.S. category.

Unfortunately, similar data are not available for students who have withdrawn. However, MacLeod and Welsh (1982) reported that median weekly salary for graduates was $266 and $235 for withdrawn students. They also indicated that the employment rate was 93 percent for graduates, as compared to 83 percent for withdrawn students, and that 82 percent of graduates had white collar jobs, while this was true for only 50 percent of the withdrawals. MacLeod and Welsh conclude, "The data imply that an RIT degree makes a difference." Additionally, it indicates that the special

[13] *Analysis of variance indicated statistically significant differences for the factor of degree, but no differences for the factor of mainstreaming.*

Table 6. **Weekly salary levels for graduates of the classes entering from 1976-1980 by mainstreaming category.**[14]

| DEGREE | | CATEGORY NTID | MIXED | B.S. |
|---|---|---|---|---|
| B.S. | $\bar{X}$ | | 350 | 338 |
| | N | | 40 | 18 |
| | SD | | 133 | 67 |
| A.A.S. | $\bar{X}$ | 275 | 299 | |
| | N | 130 | 19 | |
| | SD | 99 | 107 | |
| CD/DP | $\bar{X}$ | 250 | 349 | |
| | N | 121 | 4 | |
| | SD | 96 | 146 | |

training provided by the Institute, concurrent with the degree, affords skills and credentials with which to compete effectively in the work environment.

## CONCLUSIONS

Three educational environments at RIT were operationally defined:

- Registration only in majors at NTID
- Registration in majors at both NTID and other colleges of RIT
- Registration only in majors at the other colleges of RIT.

These three classifications permitted the authors to explore the characteristics of students enrolled, their success in the NTID/RIT environment, and in the post-graduation workplace.

The major finding from the study is that students served in the three environments appear to represent three distinct groups in terms of all the variables evaluated in this study.

[14] *Analysis of variance showed statistically significant differences for the factor of degree, but not for the factor of mainstreaming.*

The NTID group, at entry, had the lowest academic achievement and oral/aural communication skills. These students entered college with an overall achievement level of 8.7 on the *Stanford Achievement Tests* and could communicate with speech and hearing in a limited way. On the other hand, this group demonstrated the best sign language skills of any group--they were able to receive most of any message communicated through the medium of sign language. Their level of achievement and difficulty in using traditional methods of communication (speech, hearing, and reading) in the classroom demands a specialized set of educational delivery systems. Evidence for this is provided by the relatively low number of credits taken at the other colleges of RIT. It can be assumed that these students cannot compete at the rapid pace of a linguistically based mainstreamed college classroom.

The NTID group has a higher attrition rate, which results from difficulties that these students have in a postsecondary level educational environment. Fifty percent of entering students in this group withdraw from NTID without certification. While this rate seems high when considered by itself, it must be evaluated in the context of the level of preparation that these students have for postsecondary study, and in the context of other public two-year colleges with liberal admission standards. According to a national study by Beal and Noel (1980), public community colleges with liberal admission standards have attrition rates of greater than 60 percent for a cohort of entering students.

From an achievement and communication perspective, the mixed group of deaf students has better academic preparation (almost 10th grade overall), better oral/aural communication skills, and better sign language skills that would permit them to understand about half of a communicated message. The most significant finding about this group is that they take a considerable number of credits both from NTID and from the other RIT colleges. It is especially interesting that this group takes a relatively large number of credits in the communication and general education areas of NTID. This coursework is probably the result of the need to improve basic skills in order to enter majors in the other RIT colleges. These findings are especially noteworthy when one considers that more than half of the degrees granted to this group were granted through the other RIT colleges.

Interesting also is the fact that the attrition rate for this group is significantly lower than that of the NTID group. This probably results

because students in this group had better academic preparation than the NTID group, and thus generally achieve better at NTID/RIT. It is possible that the mixed group of students, because of better secondary preparation, can make better use of the remedial programs offered by NTID.

The B.S. group represents students with skills closest to those of their hearing peers. Their average achievement level is better than 10th grade--they have excellent oral/aural skills, but poor sign language abilities. This high level of academic preparation permits them to compete well with their hearing peers. This fact is evidenced by an attrition rate of 28 percent for the entering cohort. This rate probably also results from the support services provided to deaf students registered in the other RIT colleges. In a sense, this is the group that probably could, to some extent, survive in a college setting, given similar support services. Certainly the NTID group, and most probably the mixed group, would not complete a program for certification in a regular college, even one with traditional support services of tutoring, notetaking, and interpreting. The reason for this is that the NTID group requires major alterations and additions to traditional methods of delivering education at the postsecondary level, and the mixed group requires extensive remediation before being admitted to the fully mainstreamed RIT environment.

Overall, it can be said that at least 97 percent (the NTID and mixed groups) of deaf RIT students require extensive remedial education, systematic alterations to the delivery of instruction, and other services offered through NTID to enable them to receive a college level degree from RIT. Because of the relationship between degree level attainment and earnings after graduation, students must be actively encouraged to seek the highest degree possible in their field of study. More students who exit with A.A.S. degrees must be encouraged to extend their stay to achieve the B.S. degree, and more who receive the diploma must be encouraged to achieve the associate degree. Such additional preparation will most certainly improve the postgraduate job levels of alumni.

## REFERENCES

Beal, P. and Noel, L. *What Works in Student Retention*. Iowa City, Iowa and Boulder, Colo.: American College testing program National Center for Higher Education Management Systems, 1980.

Breland, H. Population Validity and College Entrance Measures. Research Monograph #8, New York: The College Board, 1979.

Breland, H. Assessing Student Characteristics in Admissions to Higher Education. Research Monograph #9, New York: The College Board, 1981.

Fairbanks, G. Voice and Articulation Drillbook, New York: Harper and Row, 1960, p. 127.

Johnson, D. Communication Characteristics of a Young Deaf Adult Population: Techniques for Evaluating their Communication Skills. American Annals of the Deaf, 121, 1976, 409-424.

MacLeod, J. and Welsh, W. 1980. Withdrawal Follow-up Study--A Comparative Analysis of NTID Students Who Withdrew and NTID Students Who Graduated. Report Number 41, Rochester, N.Y.: Rochester Institute of Technology, 1982.

Madden, R., Gardner, E., Rudman, H., Karlsen, B., and Merwin, J. Stanford Achievement Test, New York: Harcourt Brace Jovanovich, Inc., 1976.

Rogasta, M. and Harrison, R. Identifying Factors that Predict Students' Academic Success in College. Princeton, N.J.: Educational Testing Service, 1985.

Tiegs, E. and Clark, W. California Reading Tests. California Test Bureau, 1963.

Trybus, R. and Karchmer, M. School Achievement Scores of Hearing-Impaired Children: National Data on Achievement Status and Growth Patterns. American Annals of the Deaf, 122, 1977, 62-69.

Welsh, W. Deaf RIT Graduates in the Workplace: 1984, Rochester, N.Y.: Rochester Institute of Technology, 1986.